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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/813,543

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F. Dan Gealy

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EXAMINER

CHEN, KEATH T

ART UNIT

PAPER NUMBER

1792

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DELIVERY MODE

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/813,543	<b>Applicant(s)</b> GEALY ET AL.	
	<b>Examiner</b> Keath T. Chen	<b>Art Unit</b> 1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 01 July 2008.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-16 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                       | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>07/01/2008</u> .  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Response to Amendment***

1. Applicant's response, filed on 07/01/2008, in response to the rejection of claims 1-16 and 29-54 of the first office action mailed on 04/01/2008, by amending claims 1 and 11 and canceling claims 17-69 is acknowledged and will be addressed below.

### ***Election/Restrictions***

2. Applicant's cancellation of invention group II, claims 17-28 and 55-69 is acknowledged.

### ***Claim Rejections - 35 USC § 103***

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

3. **Claims 1-6, 10-12, and 14-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bennett et al. (US 5367139, hereafter '139), in view of Shinriki et al. (WO 02/15243, hereafter '243). (US 6806211, hereafter '211, is cited for corresponding English version of the '243).**

'139 teaches some limitations of:

Claim 1: An apparatus (Figs. 6 & 7), comprising: a chamber (#10, col. 9, lines 31-34) adapted to receive a first precursor gas (Fig. 4, SiF<sub>4</sub>, col. 18, line 12; However, gas identity is intended use in the apparatus claim); at least one surface interior to the chamber (the inner surface of chamber wall #30); an acoustic wave driver (pulse generator #54 and power supplies #50-52 and acoustic transducers #61 and #62, col.

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16, lines 18-29; also named piezoelectric transducers T #34, col. 9, lines 17-19 in Fig.

1).

Applicant's claim requirements "precursor gas(es)" are considered intended use in the pending apparatus claims. Further, it has been held that claim language that simply specifies an intended use or field of use for the invention generally will not limit the scope of a claim (Walter, 618 F.2d at 769, 205 USPQ at 409; MPEP 2106).

Additionally, in apparatus claims, intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim (In re Casey, 152 USPQ 235 (CCPA 1967); In re Otto, 136 USPQ 458, 459 (CCPA 1963); MPEP 2111.02).

Therefore, '139 teaches the use acoustic wave to reduce the contamination (col. 3, lines 54-58).

'139 does not explicitly teaches the other limitation of:

Claim 1: A piezoelectric liner coupled to the at least one surface of the chamber; and (the acoustic wave driver) is deployed on the piezoelectric liner.

Claim 11: The apparatus of claim 1, wherein the piezoelectric liner is cylindrical.

Claim 12: The apparatus of claim 11, wherein the piezoelectric liner is a quartz liner.

'243 is an analogous art in the field of semiconductor processing (abstract), particularly in contamination (last paragraph of page 26, see also '211, col. 18, lines 48-52). '243 teaches quartz liners (Fig. 19, #202A-B, 2<sup>nd</sup> paragraph of page 26 or '211 col. 18, 2<sup>nd</sup> paragraph, and #201d, 2<sup>nd</sup> paragraph of page 27, or '211 col. 18, last paragraph), for the purpose of avoiding contamination (last paragraph of page 26 or '211, col. 18, lines 48-52).

At the time of the invention was made, it would have been obvious to a person of ordinary skill in the art to have added quartz/piezoelectric liner, as taught by '243, to the apparatus in Figs. 6-7 of '139, for the purpose of avoiding contamination. This quartz/piezoelectric liner obvious would have to be cylindrical shape to fit over the inner wall of chamber #30 in Fig. 7 of '139. Furthermore, to have moved the acoustic wave driver #61 and #62 from the chamber wall to the piezoelectric liner because it is well-known in the art that the contamination will be formed on the liner instead of the chamber wall when liner is deployed.

'139 further teaches the limitations of:

Claim 2: The apparatus of claim 1, wherein the acoustic wave driver (#61 and #62) is adapted to drive the surface acoustic wave in a selected range of frequencies (by using pulse generator #54, col. 16, lines 26-29; see also col. 11, lines 62-65).

Claim 3: The apparatus of claim 2, wherein the range of frequencies is selected based upon the composition of the first precursor gas (the apparatus is capable being selected by precursor composition or mass).

Applicant's claim requirements "frequency is selected ..." are considered intended use in the pending apparatus claims. Further, it has been held that claim language that simply specifies an intended use or field of use for the invention generally will not limit the scope of a claim (Walter, 618 F.2d at 769, 205 USPQ at 409; MPEP 2106). Additionally, in apparatus claims, intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim (In re Casey, 152 USPQ 235 (CCPA 1967); In re Otto, 136 USPQ 458, 459 (CCPA 1963); MPEP2111.02).

Claim 4: The apparatus of claim 3, wherein the range of frequencies is selected based upon a mass of the molecules in the first precursor gas (intended use).

Claim 5: The apparatus of claim 4, wherein the range of frequencies has a midpoint frequency, and wherein the midpoint frequency is decreased when the mass of the molecules in the first precursor gas is increased (intended use).

Applicant's claim requirements "midpoint frequency is decreased/increased ..." are considered intended use in the pending apparatus claims. Further, it has been held that claim language that simply specifies an intended use or field of use for the invention generally will not limit the scope of a claim (Walter, 618 F.2d at 769, 205 USPQ at 409; MPEP 2106). Additionally, in apparatus claims, intended use must result in a structural

difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim (In re Casey, 152 USPQ 235 (CCPA 1967); In re Otto, 136 USPQ 458, 459 (CCPA 1963); MPEP2111.02).

Claim 6: The apparatus of claim 4, wherein the range of frequencies has a midpoint frequency, and wherein the midpoint frequency is increased when the mass of the molecules in the first precursor gas is decreased (intended use).

Claim 10: The apparatus of claim 1, wherein the acoustic wave driver comprises at least one transducer (#61 or #62, col. 16, lines 18-21).

Claim 14: The apparatus of claim 1, wherein the at least one surface comprises an interior surface of the chamber (inner surface of #30).

Claim 15: The apparatus of claim 1, further comprising a pump (vacuum throat #31, col. 9, lines 31-34, see also col. 17, lines 58-61) coupled to the chamber (#10) and operable to evacuate the first precursor gas from the chamber (pump is capable of evacuate precursor gas).

Claim 16: The apparatus of claim 1, wherein the chamber is adapted to receive a second precursor gas (NF<sub>3</sub> or CF<sub>4</sub>, col. 17, line 49. However, gas identity is considered intended use).

**4. Claims 7-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over '139 and '243, in view of Koinuma et al. (US 5569502, hereafter '502).**

'139 and '243, together, teach all limitations of claims 1-2, as discussed above. '139 further teaches the use of piezoelectric acoustic transducer (col. 9, lines 17-19) on

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the chamber wall to produce pressure wave (col. 11, lines 28-37) to reduce particle contamination, the frequency is chosen to minimize the transduction impedance and to maximize the gettering of suspended particles (col. 11, lines 62-65) or the mass of particulates (col. 11, lines 23-27); or in using surface (col. 15, lines 18-21) acoustic wave in acoustic stress (col. 16, lines 14-32); and the surface acoustic wave and pressure wave can be combined (col. 17, lines 4-5); but is silent on the details of acoustic transducer design.

'139 does not teach the limitations of:

Claims 7: The apparatus of claim 2, wherein the selected range of frequencies is chosen from an overall range of about 100 Hz to about 200 kHz.

Claim 8: The apparatus of claim 1, wherein the acoustic wave driver comprises at least one pair of electrodes.

'502 is an analogous art in the field of semiconductor (col. 5, lines 35-36) deposition (plasma CVD and PVD, col. 5, lines 27-32; '139, col. 13, lines 3-12), particularly in detail of generation of surface acoustic wave (col. 2, lines 18-26). '502 teaches a pair of comb-shaped electrodes (Fig. 3, #32 and #32', col. 6, lines 1-6) on piezoelectric (#31 made of lithium niobate, col. 6, lines 1-3, is a piezoelectric, col. 4, lines 58-59) with frequency from 0.1 to 1000 Hz (col. 7, lines 64-66) to provide a surface acoustic wave (col. 2, lines 18-26).



At the time of the invention was made, it would have been obvious to a person of ordinary skill in the art to have adopted the comb-shaped electrode pair, as taught by '502, to the piezoelectric acoustic transducer (T #34 in Fig. 1 or #61-62 in Figs. 6-7) of '139, as a suitable design for the piezoelectric acoustic transducer. The selection of something based on its known suitability for its intended use has been held to support a *prima facie* case of obviousness. *Sinclair & Carroll Co. v. Interchemical Corp.*, U.S. 327, 65 USPQ 297 (1945).

For claim 7, '139 discloses the claimed invention except for frequency range. It would have been obvious to a person having ordinary skill in the art at the time the invention was made to optimize the frequency range, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). The frequency is a result effective variable as taught by '139 (col. 11, lines 62-65).

**5. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over '139, '243, and '502, further in view of 'T Hoen (US 4518889, hereafter '889).**

'139, '243, and '502, together, teach all limitations of claim 8, as discussed above. '139 further teaches the use of piezoelectric acoustic transducer (col. 9, lines 17-19) on the chamber wall to produce pressure wave (col. 11, lines 28-37) and the use of lateral wave to direct the particle (col. 9, lines 57-61) to sweep the particles away from the critical regions of the wafer (col. 9, line 35-38). '502 teaches a plurality of comb-

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shaped electrodes 32 and 32' in parallel arrangement to generate different frequency simultaneously (col. 6, lines 7-11).

'139, '243, and '502, together, do not teach the limitations of:

Claim 9: The apparatus of claim 8, wherein the pair of electrodes is a pair of apodized electrodes.

'889 is an analogous art in the field of piezoelectric ultrasound transducers, particularly in apodized transducer (field of invention). '899 teaches apodized electrodes by shaping the applied electric field through use of different electrode geometries, which is similar to '502's multi-pairs of electrodes, on opposite sides for the purpose of improving off-axis intensity (col. 2, lines 2-11) and improved directivity (field of invention).

At the time of the invention was made, it would have been obvious to a person of ordinary skill in the art to have apodized the pair of electrodes, as taught by '889, in the combination of '502, '243, and '139, for the purpose of improving directivity (field of invention), to suit the purpose of direct particles (of varying mass) away from the critical regions of wafer surface ('139, col. 9, lines 57-61 and lines 35-38).

**6. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over '139 and '243, in view of Oehrlein et al. (US 5798016, hereafter '016).**

'139 and '243, together, teach all limitations of claim 11, as discussed above.

'139 and '243, together, do not explicitly teach the limitations of:

Claim 13: The apparatus of claim 11, wherein the at least one surface comprises a plurality of piezoelectric liners.

'019 is an analogous art in the field of semiconductor etching (abstract; '139, col. 6, lines 5-10), particularly in preventing particle formation (col. 5, lines 41-47; '139, col. 3, line 54-58). '019 teaches quartz (col. 5, line 27) liners (#37 and #39, Fig. 3a; col. 5, lines 57-60) for the purpose of preventing particle formation (col. 5, lines 41-47).

At the time of the invention was made, it would have been obvious to a person of ordinary skill in the art to have added multiple liners to the reaction chamber, as taught by '019 to the apparatus in Figs. 6-7 of '139, for the purpose of preventing particle formation (col. 5, lines 41-47).

'139 and '243, together, disclose the claimed invention except for multiple piezoelectric liners. It would have been an obvious matter of design choice to duplicate quartz liners, since it has been held that mere duplication of the essential working parts of a device involves only routine skill in the art. *St. Regis Paper Co. v. Bemis Co.*, 193 USPQ 8.

### ***Response to Arguments***

Applicant's arguments filed 05/27/2008 have been fully considered but they are not persuasive.

7. Applicant's cancellation of claim 25 overcomes drawing objection.
8. Applicants argue the patentability of amended claim 1, see the first complete paragraph of page 6, based on '502 apparatus is for deposition and '139 apparatus is for removal of contamination.

This argument is found not persuasive for several reasons.

First of all, '139 lack of explicit teaching of piezoelectric liners is taught by '243. Not '502. The rationale of combining '139 and '243 is discussed above.

Assuming Applicant is arguing the combination of claims 7-9 based on the combination of '139, '243, and '502. '139 teaches acoustic transducer but lack of detail of transducer design. '502 provides a detailed transducer design. Both '139 and '502 are in the field of deposition ('139, col. 1, line 25-28 and col. 13, lines 3-12), a person of ordinary in the art would have searched the field of deposition and recognized the suitable design and operation frequency of the transducer design from '502.

### ***Conclusion***

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Keath T. Chen whose telephone number is 571-270-1870. The examiner can normally be reached on M-F, 8:30-5:00 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Cleveland can be reached on 571-272-1418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/K. T. C./  
Examiner, Art Unit 1792

/Michael Cleveland/  
Supervisory Patent Examiner, Art Unit 1792